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**COLLABORATIVE-BASED WEB RECOMMENDER SYSTEM  
FOR COMMUNITY-DRIVEN HOMESTAY PROGRAMMES**

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**MASTER OF SCIENCE (DECISION SCIENCE)  
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## Abstrak

Program Homestay adalah sejenis inisiatif pelancongan yang mana penduduk tempatan menjemput pelancong untuk berinteraksi dengan mereka dan mengikuti aktiviti harian masyarakat dan budaya, termasuk pilihan untuk penginapan. Kesan program homestay kepada masyarakat dapat dilihat melalui pembangunan ekonomi, modal sosial, infrastruktur dan alam sekitar. Oleh itu, program homestay menggalakkan pelancongan berasaskan komuniti (CBT) dan bertindak sebagai pemangkin kepada pembangunan masyarakat luar bandar. Kebanyakan program homestay terletak di kawasan luar bandar, dan dengan itu, secara langsung dapat memperkenalkan pelbagai budaya Malaysia. Walaupun pelancongan homestay adalah industri yang semakin meningkat di negara membangun, namun terdapat beberapa cabaran yang dihadapi dalam pengendalian program homestay di Malaysia, memandangkan CBT ini tidak dapat berkembang seperti mana inisiatif pelancongan lain. Semua cabaran ini telah membawa kepada punca utama, iaitu, kekurangan promosi dan pemasaran disebabkan oleh ketidakupayaan pengusaha homestay untuk menggunakan teknologi. Oleh itu, untuk mengatasi masalah ini, satu sistem baru, iaitu sistem *Collaborative-Based Web Recommender* (CBWR) yang memenuhi kriteria tertentu untuk penyampaian perkhidmatan homestay yang berkesan dan cekap dibangunkan. Sistem CBWR ini bertindak sebagai rangkaian pangkalan data yang berfungsi sebagai perantara antara pengguna (pengunjung) dan pembekal perkhidmatan, iaitu, pengusaha program homestay. Tambahan pula, CBWR ini juga boleh mewujudkan perkongsian antara pangkalan data homestay dan laman *web recommender* homestay dengan mengumpul butiran pengguna dan menyimpannya, yang mana dilakukan oleh *profiler*. Seterusnya, kriteria yang sesuai diwujudkan. Semua operasi ini dijalankan serentak untuk meningkatkan fungsi sistem CBWR ini. Justeru itu, kajian ini menyumbang kepada pembangunan pangkalan data web tertentu dan sistem CBWR. Selain itu, sistem CBWR ini menyediakan algoritma *recommender* sokongan yang dijalankan dalam persekitaran yang membolehkan dan menyokong web dalam masa sebenar. Dengan itu, pengguna boleh melayari program homestay yang tersedia dengan keunikan produk serta perkhidmatan yang ditawarkan.

**Kata kunci:** Program homestay, Pelancongan berasaskan komuniti, Promosi homestay, Sistem Collaborative-Based Web Recommender

## Abstract

A Homestay Programme (HP) is a kind of tourism initiative where local residents welcome tourists to stay and interact with them and experience the community's daily activities and culture, including an option for lodging. The effects of HPs on the community are reflected in the development of the economy, social capital, infrastructure and environment. Hence, a HP promotes community-based tourism (CBT) and acts as a catalyst for rural community development. Most HPs are located in the rural areas, and thus, are directly linked to showcasing the various Malaysian cultures. Although homestay tourism is a growing industry in developing countries, there are some challenges faced in operating the Malaysian HPs since this CBT does not seem to be flourishing in a similar manner as the other tourism initiatives. All of these challenges have led to the main cause that is, lack of promotion and marketing due to the inability of homestay operators to utilize technology. Therefore, to overcome this, an enhanced Collaborative-Based Web Recommender (CBWR) system that meets certain criteria for an effective and efficient homestay service delivery is developed based on the user and item approach. This CBWR system acts as a database network that serves as an intermediary between users (visitors) and the service providers, who are the HP operator. Furthermore, this CBWR can also create a partnership between the homestay database and the homestay recommender website by capturing the users' details and storing it, which is done by the profiler. Consequently, the profiler recommends several websites that suit to the user's request. All these operations are carried out simultaneously to boost the functions of the CBWR system. Hence, this research contributes to the development of a specific unique web database and a CBWR system, which is adopted from collaborative algorithm. In addition, the CBWR system provides a supportive recommender algorithm which is carried out in a web enabling environment in real time. This enables users to find the available personalized website and unique HPs with their signature products and services.

**Keywords:** Collaborative-Based Web Recommender system, Homestay programme, Community-Based Tourism, Homestay promotion

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# **CHAPTER ONE**

## **INTRODUCTION**

The United Nations World Tourism Organization (UNWTO), in its publications, shows that the tourism industry has experienced sustained development and diversity to become the biggest and most rapidly growing economic sector of the many sectors in the world (UNWTO, 2013; Tan, Sasidaran & Ye, 2016). Tourism has become one of the instrumental forces for a country's socio-economy progress (Platzer, 2014). Tourism has been able to produce an estimated gross production of US \$7.2 trillion (WTTC, 2016). The tourism industry has bright prospects based on the World Tourism Organization (WTO) report which stated that two billion tourists have travelled around the globe in 2015. Tourism is advancing rapidly and contributing to the growth of not only developed countries but developing countries as well. Furthermore, tourism and its potential for developing countries have been determined as a significant predictor for the growth of global tourism (Palmer, 2002; Honey, 1999; Mowforth & Munt, 1998).

### **1.1 Tourism in Malaysia**

The tourism is the second biggest contributor to the Malaysian economy. The efforts taken by Malaysia for the growth of and in promoting tourism have produced notable outcomes. In the year 2013, 25.72 million tourists visited Malaysia resulting in a RM 65.44 billion income to its economy. This amount represents a growth of 11% in the number of tourists and 10.4% in earnings in comparison with year 2012. The growth is considered remarkable provided the problematic and challenging situation

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## Appendix A: Questionnaire for CBWR Homestay website assessment



### Dear Participant

My name is Mahadi Hasan Miraz and I am a graduate student at University Utara Malaysia. For my final thesis requirement, I am administrating a survey as below. You are randomly selected as the participant of the survey. Please participate in this research study by completing the attached survey.

The following questionnaire requires only a short some time to complete. There is no compensation for responding nor is there any known risk to finish the questionnaire. All information will remain confidential. Copies of the project will be provided to the University is authority. If you choose to participate in this study, please answer all questions as honestly as possible and return the completed questionnaire promptly. Participation is strictly voluntary and you are welcome to be a part of the study.

Thank you for taking the time to assist me in my educational endeavors. The data collected will provide useful information regarding the website evaluation. Completion and returning of the questionnaire will indicate your willingness to participate in this study. If you require additional information or have questions, please feel free to contact me at the address below.

Sincerely,  
Mahadi Hasan Miraz  
Mahadimiraz1@gmail.com

**Name:**

**Occupation:**

**Nationality:**

			1	2	3	4	5	6	7		NA
1. Please rate our website on the overall content	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree	<input type="radio"/>
2. Please rate our website on the ease of navigation	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree	<input type="radio"/>
3. Please rate our website on the overall the look.	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree	<input type="radio"/>
4. The vocabulary on our website is appropriate for the intended audience	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree	<input type="radio"/>
5. The illustrations are appropriate	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree	<input type="radio"/>
6. The text is clearly written and easy to understand	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree	<input type="radio"/>
7. There are no grammar or spelling errors	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree	<input type="radio"/>
8. The information on our website is accurate	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree	<input type="radio"/>
9. The information is timely and up-to-date	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree	<input type="radio"/>
10. The information is sufficient for the intended audience	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree	<input type="radio"/>
11. The organization of the site is logical and clear	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree	<input type="radio"/>
12. The user can clearly see where she/ he is on the site	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree	<input type="radio"/>
13. The user can easily move	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree	<input type="radio"/>

through the site to  
a desired location

- |                                                                     |                   |                       |                       |                       |                       |                       |                       |                       |                |                       |
|---------------------------------------------------------------------|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------|-----------------------|
| 14. The style is consistent throughout the site                     | strongly disagree | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | strongly agree | <input type="radio"/> |
| 15. Links are current and working                                   | strongly disagree | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | strongly agree | <input type="radio"/> |
| 16. The background colors are pleasing                              | strongly disagree | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | strongly agree | <input type="radio"/> |
| 17. Visuals enhance rather than reduce from the message of the site | strongly disagree | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | strongly agree | <input type="radio"/> |
| 18. The size of the text is easy to read                            | strongly disagree | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | strongly agree | <input type="radio"/> |
| 19. The site is attractiveness-                                     | strongly disagree | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | strongly agree | <input type="radio"/> |

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Source: (Ovretveit, 2001).



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## APPENDIX B: Calculation of total users for CBWR websites

### 1. Calculating the Total user of Homestya D'Belimbing

To find the total number of viewer who viewed the Homestay D-Belimbing. Then the web recommended website homepage will show the visitor history of Homestay D-belimbing.

$$H=U \times I; W=R+ (N+S) \text{ for } N=1, 2, \dots, S$$

Where,

$H$  = User recommendations

$U$  = User ID

$I$  = Number of users that access a particular homestay recommended website

$N$  = User identity number (Where  $N$  is integer)

$S$  = New number of users

$W$  = Particular user for CBWR website

$G$  = Number of current user

$$H = U * I$$

$$H = 1 * 1$$

$$H = 1$$

$$W = H + N \quad [R=1, H=1]$$

$$W = 1 + 1$$

$$W = 2$$

$$G = H + (N + S) \quad [S=1, H=1, N=1]$$

$$G = 1 + 1 + 1$$

$$G = 3$$

$$DB = H + (N + S) \quad [S=63, H=1, N=1]$$

$$DB = 1 + 1 + 63$$

$$DB = 65$$

Where,

$DB$  = Recommended website

Finally, the CBWR website shows the user recommendation for Homestay D-belimbing.

### 2. Total user of homestay Kampung Raga

To find the total number of viewer who viewed the Homestay Kampung Raga. Then the web recommended website homepage will show the visitor history of Homestay Kampung Raga.

$$H=U \times I; W=R+ (N+S) \text{ for } N=1, 2, \dots, S$$

Where,

$H$  = User recommendations

$U$  = User ID

$I$  = Number of users that access a particular homestay recommended website

$N$  = User identity number (Where  $N$  is integer)

$S$  = New number of users

$W$  = Particular user for CBWR website

$KR$  = Total user of Kampung Raga  
 $G$  = Number of current user  
 $H=U \times I$ ;  $W=R+(N+S)$  for  $N=1, 2, \dots, S$

$H = U \times I$   
 $H = 1 \times 1$   
 $H = 1$   
 $W = H + N$  [ $N=1, H=1$ ]  
 $W = 1 + 1$   
 $W = 2$   
 $G = H + (N+S)$  [ $S=1, H=1, N=1$ ]  
 $G = 1 + 1 + 1$   
 $G = 3$

$KR = H + (N + S)$  [ $S=39, H=1, N=1$ ]  
 $KR = 1 + 1 + 39$   
 $KR = 41$

Finally, the CBWR website shows the user recommendation for Homestay Kampung Raga.

### 3. Total user of homestay Pulau Pisang

To find the total number of viewer who viewed the Homestay Pulau Pisang. Then the web recommended website homepage will show the visitor history of Homestay Pulau Pisang.

$H=U \times I$ ;  $W=R+(N+S)$  for  $N=1, 2, \dots, S$

Where,

$H$  = User recommendations

$U$  = User ID

$I$  = Number of users that access a particular homestay recommended website

$N$  = User identity number (Where  $N$  is integer)

$S$  = New number of users

$W$  = Particular user for CBWR website

$G$  = Number of current user

$H = U \times I$   
 $H = 1 \times 1$   
 $H = 1$   
 $W = H + N$  [ $N=1, H=1$ ]  
 $W = 1 + 1$   
 $W = 2$   
 $G = H + (N+S)$  [ $S=1, H=1, N=1$ ]  
 $G = 1 + 1 + 1$   
 $G = 3$   
 $PP = H + (N + S)$  [ $S=39, H=1, N=1$ ]  
 $PP = 1 + 1 + 39$   
 $PP = 41$

Finally, the CBWR website shows the user recommendation for Homestay Pulau Pisang.

#### 4. Total user of homestay Pantai Jamai

To find the total number of viewer who viewed the Homestay Pantai Jamai. Then the web recommended website homepage will show the visitor history of Homestay Pantai Jamai.

$$H=U \times I; W=R+ (N+S) \text{ for } N=1, 2, \dots, S$$

Where,

$H$  = User recommendations

$U$  = User ID

$I$  = Number of users that access a particular homestay recommended website

$N$  = User identity number (Where  $N$  is integer)

$S$  = New number of users

$W$  = Particular user for CBWR website

$G$  = Number of current user

$PJ$  = Recommended website

$$H = U * I$$

$$H = 1 * 1$$

$$H = 1$$

$$W = H + N \quad [N=1, H=1]$$

$$W = 1 + 1$$

$$W = 2$$

$$G = H + (N+S) \quad [S=1, H=1, N=1]$$

$$G = 1 + 1 + 1$$

$$G = 3$$

$$PJ = H + (N+S) \quad [S=39, H=1, N=1]$$

$$PJ = 1 + 1 + 39$$

$$PJ = 41$$

Finally, the CBWR website shows the user recommendation for Homestay Pantai Jamai.

#### 5. Total user of homestay Paya Guring

To find the total number of viewer who viewed the Homestay Paya Guring. Then the web recommended website homepage will show the visitor history of Homestay Paya Guring.

$$H=U \times I; W=R+ (N+S) \text{ for } N=1, 2, \dots, S$$

Where,

$H$  = User recommendations

$U$  = User ID

$I$  = Number of users that access a particular homestay recommended website

$N$  = User identity number (Where  $N$  is integer)

$S$  = New number of users

$W$  = Particular user for CBWR website

$G$  = Number of current user

$PG$  = Recommended website

$$H = U * I$$

$$H = 1 * 1$$

$$H = 1$$

$$\begin{aligned}
W &= H+N \quad [N=1, H=1] \\
W &= 1+1 \\
W &= 2 \\
G &= H+ (N+S) \quad [S=1, H=1, N=1] \\
G &= 1+1+1 \\
G &= 3 \\
PG &= H+ (N+ S) \quad [S=39, H=1, N=1] \\
PG &= 1+1+39 \\
PG &= 41
\end{aligned}$$

Finally, the CBWR website shows the user recommendation for Homestay Paya Guring.

## 6. Total user of homestay Pulau Tuba

To find the total number of viewer who viewed the Homestay Pulau Tuba. Then the web recommended website homepage will show the visitor history of Homestay Pualu Tuba.

$$H=U \times I; W=R+ (N+S) \quad \text{for } N=1, 2, \dots, S$$

Where,

$H$  = User recommendations

$U$  = User ID

$I$  = Number of users that access a particular homestay recommended website

$N$  = User identity number (Where  $N$  is integer)

$S$  = New number of users

$W$  = Particular user for CBWR website

$PT$  = Recommended website

$G$  = Number of current user

$$\begin{aligned}
H &= U \times I \\
H &= 1 \times 1 \\
H &= 1 \\
W &= H+N \quad [N=1, H=1] \\
W &= 1+1 \\
W &= 2 \\
G &= H+ (N+S) \quad [S=1, H=1, N=1] \\
G &= 1+1+1 \\
G &= 3 \\
PT &= H+ (N+ S) \quad [S=39, H=1, N=1] \\
PT &= 1+1+39 \\
PT &= 41
\end{aligned}$$

Finally, the CBWR website shows the user recommendation for Homestay Pulau Tuba.

## 7. The total user of homestay Sungai Badak

To find the total number of viewer who viewed the Homestay Sungai Badak. Then the web recommended website homepage will show the visitor history of Homestay Sungai Badak.

$$H=U \times I; W=R+ (N+S) \quad \text{for } N=1, 2, \dots, S$$



Where,

$H$  = User recommendations

$U$  = User ID

$I$  = Number of users that access a particular homestay recommended website

$N$  = User identity number (Where  $N$  is integer)

$S$  = New number of users

$W$  = Particular user for CBWR website

$SB$  = Recommended website

$G$  = Number of current user

$$H = U * I$$

$$H = 1 * 1$$

$$H = 1$$

$$W = H + N \quad [N=1, H=1]$$

$$W = 1 + 1$$

$$W = 2$$

$$G = H + (N + S) \quad [S=1, H=1, N=1]$$

$$G = 1 + 1 + 1$$

$$G = 3$$

$$SB = H + (N + S) \quad [S=39, H=1, N=1]$$

$$SB = 1 + 1 + 39$$

$$SB = 41$$

Finally, the CBWR website shows the user recommendation for Homestay Sungai Badak.



No	Conference Proceedings
1	Mahadi Hasan Miraz, Razamin Ramli, Mohd Faizal Omar, Kalsom Kayat & Ku Ruhana Ku-Mahamud.(2016) Community-Driven Innovative Technology: An Avenue to Promote Malaysian Homestay programmes, international conference on science, Technology & engineering and Management, 19-20 May 2016, Muscat, Oman.
2	Mahadi Hasan Miraz, Razamin Ramli & Ku Ruhana Ku-Mahamud, (2015). Web Recommender for Homestay Malaysia, International Conference on Technology Management, Business and Entrepreneurship (ICTMBE), Kings Green Hotel Melaka, 24-25 November 2015
3	Mahadi hasan miraz, Ferdoush Saleheen & Mashour Rahman, (2016). Supply chain management in service Quality, International Conference on Industrial Engineering and Operations Management in Kuala Lumpur, Malaysia, 8-10 March, 2016
4	Mahadi Hasan Miraz, Razamin Raml, Ku Ruhana Ku-Mahamud, Abu Raihan Bhuiyan Albarune & Foazul Islam.(2015). A Study on Homestay Malaysia: ICT Applications, Proceedings of International Conference on Networking and Computer Application, July 15-16, 2015, IEEE, ISBN: 9788193137314

No	Journal articles
1	Mahadi Hasan Miraz, Razamin Raml, Ku Ruhana Ku-Mahamud, Abu Raihan Bhuiyan Albarune & Foazul Islam.(2015). ICT APPLICATIONS ON HOMESTAY MALAYSIA. International Journal of Science Research and Technology Volume 1 Issue 2, p p 22-31, 15th December 2015, IEEE, ISSN: 2379-3686.
2	Saleheen, F., Miraz, M.H., Ramli, R. (2014). IT Operations in Retail Banking: A Case Study, Journal of Applied Management and Investments (Scopus) 2014, vol. 3, issue 4, pp. 245-250.
3	Miraz, M.H., Saleheen, F., Habib, Dr. Md. Mamun, Mahmuddin, M. & Nazri, E. (2015). Mobile banking: challenges and opportunity, a case study in Bangladesh. Advanced Education and Management (Scopus), Guilin, China, 2015
4	Saleheen, F., Miraz, M..H., Habib, Dr. Md. Mamun., Hanafi, Dr. Zurina. (2014). Challenges of Warehouse Operations: A Case Study in Retail Supermarket, International Journal of Supply Chain Management (IJSCM) (Scopus), 2014, vol.3, no.4, pp 63-67